REMARKS

Applicant has amended claims 1, 8, 10-11, 14, 23-25, 29, 31-32 and 34 and canceled claim 30. Claims 1-29 and 31-34 are pending. Reconsideration of this application, as amended, is requested.

Section 112 Rejections

Claims 8-11, 17, 23-24 and 26-34 were rejected under 35 U.S.C. 112, second paragraph. Claims 8, 11, 23-24, 31-32 and 34 have been amended, as suggested by the Examiner, to better clarify the claims. Applicant believes these changes, which carry over to their dependent claims, address the rejections. Withdrawal of the rejection is requested.

To answer the questions raised by the Examiner in respect to claims 8, 9 and 34, Applicant directs the Examiner's attention to Figure 2 and the discussion at page 10, lines 8-16. The faces of the abrasive composite are curved, the side edges of which are defined by a parabolic function. This parabolic function may include a square root function. Applicant contends that this explanation, in addition to the amendments to claims 8 and 34, clarifies the intended composite structure.

Section 103 Rejections

Claims 1-34 were rejected under 35 U.S.C. 103(a) as unpatentable over Hoopman et al ('248) in view of Abrahamson. Claims 1-34 were also rejected under 35 U.S.C. 103(a) as unpatentable over Hoopman et al ('178) in view of Abrahamson. Applicant disagrees with both of these rejections.

Applicant does not disagree that both Hoopman '248 and Hoopman '217 are directed to abrasive articles having abrasive composites that comprise abrasive particles in a radiation curable binder. The references disclose abrasive composites ranging from 25 to 1020 micrometers tall ('248 patent) and 50 to 1020 micrometers tall ('217 patent), and having various shapes, including frusto-conical with a rounded, hemispherical or domed outer end ('217 patent). Other shapes are also disclosed in both patents. The abrasive particles in the composites can be 0.1 to 1500 micrometers in size, and an example abrasive particle suitable in the composites is ceramic aluminum oxide.

Both the '248 and '217 patents discuss the difficulty in obtaining "a relatively high rate of cut while concomitantly imparting a relatively fine surface finish on the workpiece being abraded." ('248 patent, column 1, lines 34-36; '217 patent, column 1, lines 32-34). Such an abrasive article "which simultaneously would provide both high cut rate and fine finish would be more convenient and highly desired in the industry." ('248 patent, column 1, lines 44-47; '217 patent, column 1, lines 42-44).

Applicant of the pending application does not disagree with this. The '248 and '217 patents provide abrasive articles that provide both high cut rate and fine finish. The current application, however, goes farther than the '248 and '217 patents, in that the current Applicant has obtained an abrasive article that does not experience the usual decrease in cut rate performance over time, as is seen in the '248 and '217 patents, thus resulting in a greater total cut.

Applicant has determined that the combination of large (i.e., at least 85 micrometer) ceramic abrasive particles in a large topography (i.e., at least 500 micrometers) composite provides improved cut performance over time. Such is recited in the pending claims.

Both '248 and '217 patents disclose a wide variety and range of composite sizes and abrasive particle sizes and types. These patents do not recognize the benefits that are obtained with the specific combination, that of large ceramic abrasive particles in a large topography, that the pending application determined. The Examples of the application demonstrate that this combination provides improved results over abrasive articles having composites that do not have all of the recited elements (i.e., large ceramic abrasive particles in a large topography).

See, for example, Table 9 on page 28 and the discussion of Examples 5-6 and Comparative Examples D-G. The test results show less of a cut rate decrease over time for Examples 5-6 (which had 100-110 micrometer ceramic aluminum oxide particles in 762 micrometer and 1016 micrometer composites) compared to Comparative Example D (which had 100 micrometer fused aluminum oxide abrasive particles in agglomerates), Comparative Examples E and F (which had 85 micrometer fused aluminum oxide particles in agglomerates), and Comparative G (which had 125 micrometer fused aluminum oxide particles in agglomerates).

See also, Table 9 and the discussion of Examples 7-8 and Comparative Example K. The test results show significantly less of a cut rate decrease over time for Examples 7-8 (which had 100-110 micrometer ceramic aluminum oxide particles in 762 micrometer and 1016 micrometer

composites) compared to Comparative Example K (which had 125 micrometer fused aluminum oxide particles in agglomerates).

Examples 10 and 11 had large particles (300 micrometers) in large topography (1016 micrometers), except that Example 10, with ceramic aluminum oxide had less cut rate decrease over time and overall greater total cut as compared to Example 11, which had fused aluminum oxide.

See also, results comparing Example 12 (which had 400 micrometer ceramic abrasive particles) to Example M (which had 400 micrometer non-ceramic abrasive particles). Table 9 shows less of a cut rate decrease and greater overall cut for Example 12 compared to Comparative M.

These test results show that abrasive articles as claimed in the present application (having ceramic abrasive particles having an average particle size of at least 85 micrometers in a composite having a size of at least 500 micrometers) have improved grinding results compared to non ceramic abrasive particles having an average particle size of at least 85 micrometers in a composite having a size of at least 500 micrometers.

Each of the test results supports Applicant's claims. The test results in Table 9 demonstrate that the specific recited configuration of the abrasive article provides the performance recited, and that various comparative abrasive articles, which do not include the specific configuration, do not have comparable performance.

The '248 and '217 patents do not recognize the specific combination of elements that provides the performance properties claimed.

Claim 1 recites an abrasive article, which after grinding at least 20 minutes, provides a cut rate that is no more than 50% less than an initial cut rate. Claim 1 has been amended as suggested by the Examiner to remove the phrase "in use". The '248 and '217 patents recognize high cut rate and fine finish, they do not recognize lasting cut rate. Various dependent claims further define the abrasive article of claim 1. Regarding claims 8 and 9, which are to a specific structure of the composite, the '248 and '217 patents do not recognize this particular structure, having curved surfaces defined by a parabolic function, which can include a square root function, is particularly beneficial.

Claim 14 recites a method of grinding, with an abrasive article, wherein after grinding at least 20 minutes, the cut rate than is no more than 50% less than an initial cut rate. Claims 15-17 further define the method of claim 14.

Claim 18 recites an abrasive article, which when tested with the prescribed Test Procedure, provides a cut rate that is no more than 15% less than the first cut rate.

Claim 19 recites an abrasive article, which when tested with the prescribed Test Procedure, provides a cut rate that is no more than 50% less than the first cut rate.

Claim 20 recites an abrasive article, which when tested with the prescribed Test Procedure, provides a cut rate that is no more than 30% less than the first cut rate.

Claim 21 recites an abrasive article, which went tested with the prescribed Test Procedure, provides a cut rate decrease that is no more than 50% less than that obtained by a fused aluminum oxide abrasive article.

Claims 22-34 are directed to methods of making the specific abrasive article. Regarding claim 34, which is to a specific structure of the composite, the '248 and '217 patents do not recognize this particular structure, having curved surfaces defined by a parabolic function, which can include a square root function, is particularly beneficial.

These claims are distinguishable and patentable over the '248 and '217 patents. Abrahamson does not remedy the missing teaching of the '248 and '217 patents, that of the improved performance results obtained with the specific element combination. Abrahamson teaches that rare earth oxide modified ceramic abrasive particles can be used in abrasive composites.

Applicant contends that the claims, as amended, are patentable, and requests withdrawal of the rejections.

Summary

In view of the above amendments and remarks, Applicant respectfully requests a Notice of Allowance. If the Examiner believes a telephone conference would advance the prosecution of this application, the Examiner is invited to telephone Applicant's attorney Rick L. Franzen, Reg. No. 51,702, at 651.736.6432.

Respectfully submitted,

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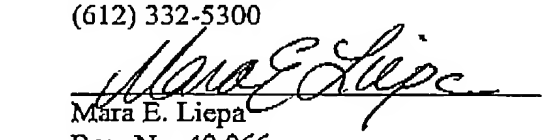

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